



**Public Water Supply
Survival Guide
for the
Phase II and V Rules**

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OVERVIEW

This guidance document is provided by the State of Kansas as a “quick reference guide” to assist Public Water Supply Systems in complying with requirements of the Phases II and V Rules which were adopted by the Environmental Protection Agency (EPA) on January 30, 1991 and July 17, 1992. These requirements have been primarily adopted by the Kansas Department of Health and Environment (KDHE) and are contained in the Kansas Primary Drinking Water Regulations. This guidance provides a summary of the applicable requirements and the dates by which the requirements must be met. It is a basic “what and when” summary for all public water systems. While all systems should feel comfortable using this document as a complete and accurate summary of Phase II/V requirements, the applicable full legal language is contained in the Kansas Administrative Regulations in conjunction with the Code of Federal Regulation which KDHE has adopted by reference.

The document does not, however, substitute for KDHE or EPA regulations, nor is it a regulation itself. It cannot impose legally-binding requirements on the State of Kansas, EPA, or water suppliers, and it may not apply to a particular water system based upon its unique circumstances. The State of Kansas and EPA retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. This survival guide applies to:

Systems: Community and non-transient non-community water supply systems (except that nitrate and nitrite requirements apply to all public water supply systems and fluoride requirements apply only to community water supply systems)

Sources: All sources

Sizes: All sizes (having at least 10 service connections or serving 25 persons year round)

Treatment: All treatments

Specific questions regarding the information contained in this document, the Kansas Primary Drinking Water Regulations, or any other matters pertaining to drinking water and public water supply systems in Kansas should be directed to

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ACRONYMS

ACC - Alternative Compliance Criteria

BAT - Best Available Technology

CCR – Consumer Confidence Report

CFR - Code of Federal Regulations

CWS - Community Water System

D/DBPR - Disinfectants and Disinfection Byproducts Rule

DBPs - Disinfection Byproducts

DBPP - Disinfection Byproducts Precursor

DOC - Dissolved Organic Carbon

EPA - United States Environmental Protection Agency

FBRR - Filter Backwash Recycling Rule

GWUDI - Ground Water Under the Direct Influence of Surface Water

HAA5s - Sum of five haloacetic acids (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, dibromoacetic acid)

IESWTR – Interim Enhanced Surface Water Treatment Rule

KDHE - Kansas Department of Health and Environment

LT1ESWTR (LT1) – Long Term 1 Enhanced Surface Water Treatment Rule

MCL - Maximum Contaminant Level

MCLG - Maximum Contaminant Level Goal

MDBP – Microbial and Disinfection Byproduct

mg/L - Milligrams per liter

MRDL - Maximum Residual Disinfectant Level (as mg/L)

NTNCWS - Non-Transient Non-Community Water System

PPM – Parts Per Million (the same as **milligrams per liter: mg/l**)

PPB – Parts Per Billion (the same as **micrograms per liter: µg/l**)

PWS - Public Water System

SDWA - Safe Drinking Water Act

TNCWS - Transient Non-Community Water System

TOC - Total Organic Carbon

TTHMs - Total trihalomethanes (Sum of chloroform, bromoform, chlorodibromomethane, and bromodichloromethane)

µg/L – Micrograms Per Liter

DEFINITIONS

CARCINOGENIC: Any substance or chemical that may or does cause cancer.

CCR: A Consumer Confidence Report is a brief summary on water quality required to be distributed by a community water supply system on an annual basis. A CCR contains basic information about the system's source(s) of water, the levels of contaminants in the finished water, compliance with drinking water rules, and educational info about contaminants / related health risks.

COMMUNITY WATER SUPPLY: Public water system with at least 10 service connections used by year-round residents or that regularly serves 25 year-round residents.

COMPLIANCE CYCLE: Time interval made up of three compliance periods, each period made-up of three-years; a compliance cycle has a total of nine years.

COMPLIANCE MONITORING: Water samples required by state or federal regulations to be collected in order to monitor water quality and determine if water system is conforming to regulations.

COMPLIANCE PERIOD: Time period made up of three calendar years; three of these periods make up a compliance cycle.

CONFIRMATION SAMPLE: Any sample collected at the discretion of the State in order to verify the analytical laboratory results of a previous sample. Confirmation samples may be required when a previous sample results are greater than the MCL.

CONTAMINANT: Any physical, chemical, biological, or radiological substance or matter in water, that usually causes an adverse effect by its presence.

DISTRIBUTION SYSTEM: System of conduits, pipes, and appurtenances by which a water supply is distributed to consumers.

EPA: The United States Environmental Protection Agency has federal oversight responsibility and authority regarding the administration and enforcement of the Safe Drinking Water Act. EPA prepares rules and technical / implementation guidance to implement the Safe Drinking Water Act through other agencies with primacy authority such as KDHE.

GROUNDWATER SYSTEM: Water supply system that is using an aquifer as a source of water. Also referred to as "well water."

GWUDI: Systems utilizing "groundwater under the direct influence of surface water" (as previously determined by KDHE) are required to treat water from these sources as specified under the Surface Water Treatment Rule.

IOC: Inorganic chemicals that do not contain hydrocarbon; many of these are elemental metals, (e.g. copper, calcium, magnesium, iron).

KDHE: The Kansas Department of Health and Environment is Kansas' primacy agency for the administration of the Safe Drinking Water Act. When the term "the State" is used in this survival guide, it refers to this agency.

MAXIMUM CONTAMINANT LEVEL (MCL): The highest allowable concentration or amount of a contaminant present in drinking water supplied by a public water supply system.

NON-COMMUNITY WATER SUPPLY: Public water supply that is not a community water system; water consumers of system are not residents.

NON-TRANSIENT NON-COMMUNITY WATER SUPPLY: Public water supply that is not a community system, but does serve the same people every day (e.g. school, industrial facility).

PHASES II AND V RULES (Chemical Monitoring): Regulations that set maximum contaminant levels (MCLs) for 83 drinking water contaminants, set monitoring and reporting requirements, and public notice requirements. These regulations are part of the Safe Drinking Water Act (SDWA) legislated by Congress in 1974 and amended in 1986.

POINT OF ENTRY (POE): A location used for collecting a treated water sample for compliance monitoring purposes. This collection site is located at a point after which the raw water has been treated and before it enters the distribution system. This location should have a metal ID tag installed by KDHE staff with a number identifying it as a POE site.

PUBLIC NOTICE: Announcement required by a PWS to be issued to all water consumers, once the PWS has a violation either by failing to do required monitoring or having monitoring results greater than the MCL. Public notice must be performed using mandatory language and methods provided by KDHE.

PUBLIC WATER SUPPLY SYSTEM (PWS): System for delivery of piped water for human consumption that has at least 10 service connections or regularly serves at least 25 persons daily at least 60 days out of the year. PWS system includes any source, treatment, storage or distribution facilities used in connection with the system.

QUARTERLY MONITORING: Monitoring that is required to be performed every three months. Yearly quarters are:

<u>First Quarter</u>	<u>Second Quarter</u>	<u>Third Quarter</u>	<u>Fourth Quarter</u>
Jan. 1 to March 31	April 1 to June 30	July 1 to Sept. 30	Oct. 1 to Dec. 31

SOC: Synthetic organic compounds, man-made compounds, many of these compounds include pesticides and herbicides, e.g. atrazine, alachlor.

SURFACE WATER: A water source that is one which is open / exposed to the atmosphere and subject to surface runoff (e.g. lakes, rivers, reservoirs).

THM: Trihalomethanes - compounds formed when chlorine added to water for disinfection, reacts with organic matter that is present in the water. THMs are suspected carcinogens.

TRANSIENT NON-COMMUNITY WATER SYSTEM: Public water system that is not a community system and serves different people each day (e.g. road side rest stop, park).

VOC: Volatile organic compounds, many of these compounds are solvents and components of fuels, e.g. benzene, toluene, xylene.

1. What are the Phases II and V Rules?

The Phases II and V Rules are part of the National Drinking Water Regulations of the federal Safe Drinking Water Act. These requirements have also been incorporated into Kansas Administrative Regulations. The Phase II requirements became effective on January 30, 1991; the Phase V requirements became effective on July 17, 1992. In general, the requirements apply only to community water supplies and non-transient, non-community water supplies. The nitrate and nitrite requirements, however, apply to all public water supplies. The fluoride requirements only apply to community water supplies.

These regulations established three important standards regarding chemical contamination monitoring for drinking water supplies, as follows:

1. Set up maximum contaminant levels and treatment techniques for 69 contaminants.
2. Set up regular and consistent monitoring frequencies for each contaminant.
3. Set up specific analytical laboratory methods appropriate to each contaminant.

These regulations established five major categories of contaminants that are required to be monitored: asbestos, nitrate / nitrite, inorganic chemicals (IOC's), volatile organic compounds (VOCs), and synthetic organic compounds (SOCs). All of these contaminants are harmful to human health, most being toxic and/or carcinogenic. Many contaminants such as solvents, pesticides and herbicides, and heavy metals are required to be monitored by these regulations.

Public water supplies must monitor for regulated contaminants under a standardized monitoring schedule consisting of three compliance periods of three years each. The total of these nine years make up each compliance cycle. The first three-year compliance period of this rule was from January 1, 1993 to December 31, 1995. The second compliance period was from January 1, 1996 to December 31, 1998. The third compliance period was from January 1, 1999 to December 31, 2001. The end of the third compliance period ended the first compliance cycle. A second nine years compliance cycle consisting of three, three year compliance periods began on January 1, 2002. A third compliance cycle will begin in 2011.

Although arsenic was not included in the original Phases II and V rulemaking, the Environmental Protection Agency adopted a new rule regarding arsenic on January 22, 2001. It is included in this summary as an inorganic chemical and because of the other associated revisions in the arsenic rule regarding all IOCs, SOC's, and VOCs.

EPA also adopted a new rule regarding disinfection byproducts on December 16, 1998, and similarly a new rule regarding radionuclides on December 7, 2000, and therefore, trihalomethanes and radionuclides are no longer included in the Kansas Phase II and V requirements. The unique monitoring provisions for these contaminants are now covered separately in updated regulations.

The monitoring of "unregulated contaminants" is now administered directly by the EPA but sample results are to still be copied to KDHE as part of the Phase II and V monitoring program.

2. Who is affected by these regulations?

Public Water Supply Systems (PWSs) are either community water systems or non-community water systems. A community water supply system (CWS) is one that has at least ten (10) service connections used by year-round residents or that regularly serves 25 year-round residents (such as a city). Systems which do not meet these criteria are defined as non-community water supply systems (NCWS), and they are further categorized to be either “transient” or “non-transient” depending on the mobile nature of the population being served.

A **transient non-community water supply system** (TNCWS) serves a non-resident population which is constantly in transition, or changing every day, such as a well at a roadside rest-stop area or a rural restaurant. A non-transient, non-community water supply system (NTNCWS) also serves a non-resident population, but it is one in which the consumers are constant, or about the same every day, such as at a rural school building or an industrial plant facility.

These regulations apply to all community water systems and non-transient non-community water systems, except that the fluoride requirements only apply to community water systems. The nitrate and nitrite requirements also apply to transient non-community water systems.

TYPES OF PUBLIC WATER SUPPLY SYSTEMS

1. COMMUNITY - Serves the same resident customers / consumers every day). Examples are towns, mobile home / trailer parks, rural water districts, subdivisions.

2. TRANSIENT NON-COMMUNITY – Serves different, non-resident consumers every day. Examples are motels, public parks, airports, campgrounds, truck-stops.

3. NON-TRANSIENT NON-COMMUNITY – Serves the same non-resident consumers every day. Examples are schools, day care facilities, industrial or manufacturing facilities.

Note that these regulations additionally categorize water systems by the size of the population served and by the source of the water used. Public water supply systems which serve **a) populations of 3,300 or less are small systems**, and **b) populations of greater than 3,300 are large systems**.

Also, public water supplies can obtain their water from either a) **groundwater** (such as from wells or springs; or b) **surface water** (such as streams, rivers, or lakes); or a combination of both groundwater and surface water.

A special classification called “groundwater under the direct influence of surface water” (GWUDI) applies to shallow wells (less than 50 feet in depth) or springs which draw water from groundwater closely associated with surface water sources. **The more stringent requirements which typically apply to surface water systems also apply to systems using GWUDI sources for public water supplies - GWUDI systems are considered surface water systems.**

Finally, **public water supplies that use both groundwater and surface water are considered surface water systems for the purposes of determining the applicability of these regulations.**

3. Compliance Monitoring

PWSs must monitor for regulated contaminants under a standardized monitoring schedule consisting of three “compliance periods” of three years each which occur within nine year “compliance cycles.”

The first compliance cycle under the Phases II and V Rules started on January 1, 1993. The first three-year compliance period which occurred within the first compliance cycle also started on January 1, 1993 and ended on December 31, 1995. The second compliance period started on January 1, 1996 (ending December 31, 1998), and the third compliance period started on January 1, 1999 (and ended December 31, 2001 to also conclude the end of the first compliance cycle).

Second and third compliance cycles of nine years each are scheduled to follow in similar sequences. A second nine years compliance cycle consisting of the three, three year compliance periods began on January 1, 2002. A third compliance cycle will begin in 2011.

SECOND COMPLIANCE CYCLE: 2002 to 2010

- 1st Compliance Period: January 1, 2002 to December 31, 2004
- 2nd Compliance Period: January 1, 2005 to December 31, 2007
- 3rd Compliance Period: January 1, 2008 to December 31, 2010

THIRD COMPLIANCE CYCLE: 2011 to 2019

- 1st Compliance Period: January 1, 2011 to December 31, 2013
- 2nd Compliance Period: January 1, 2014 to December 31, 2016
- 3rd Compliance Period: January 1, 2017 to December 31, 2019

During these compliance periods, PWSs are required to do specific monitoring depending on the size of their population and whether they use surface water or groundwater. PWSs with surface water as their source are required to monitor more frequently, since their source is more vulnerable to contaminants than groundwater. Large PWSs (population >3,300) are also required to monitor more frequently than small PWSs (population # 3,300).

These regulations also specify that, with the exception of asbestos monitoring, all other water samples must be collected at the **point of entry (POE)**. The POE collection site is located at a point after which the raw water has been treated and before it enters the distribution system. For most PWSs, the POE will be at a location immediately following chlorination. This location should have a metal ID tag installed by KDHE staff with a number identifying it as a POE site.

PWSs that are out of compliance with these regulations, either by failing to monitor or having an MCL violation, are required to issue **public notice**. PWSs must notify all water consumers of the violation in writing using newspaper, mail, and/or posted notices. In cases of acute MCL violations, public notice must also be issued via television and radio. Public notices must be issued using mandatory language as specified by regulations. Adding explanatory wording or statements following the mandatory language of the public notice by the PWS is permissible as long as it does not negate or confuse the purpose of the notice.

4. Asbestos Monitoring

In recent years, the health risk posed by the presence of asbestos has been brought to the forefront of public awareness. Inhalation of asbestos fibers has been shown to produce lung tumors in laboratory animals and in humans. Ingestion of asbestos fibers which are greater than 10 micrometers in length has been shown to cause benign tumors in laboratory rats. To reduce the potential risk of cancer or other adverse health effects observed in laboratory animals, Kansas and federal regulations have set the MCL for asbestos at seven (7) million fibers (fibers longer than 10 micrometers) per liter.

Generally, asbestos enters drinking water from either contact with natural mineral deposits or asbestos-cement pipes used in water distribution systems. In geologic parameters, there is no naturally occurring asbestos present in the rock or mineral formations in Kansas. Therefore, KDHE obtained a statewide waiver from EPA which exempts Kansas PWSs from having to perform asbestos monitoring.

PWSs using asbestos-cement pipes in their distribution systems, however, are required to test for asbestos. In order to properly identify PWSs having asbestos-cement pipes in these systems, KDHE conducted a survey of all viable PWSs in 1993. These PWSs were required to monitor for asbestos in their distribution systems at a point after the water had passed through the asbestos pipes. This monitoring was required to be completed before the end of the first compliance period (December 31, 1995). The results of this survey identified 208 PWSs having asbestos-cement pipes in their distribution systems.

Systems without asbestos-cement pipe in their distribution systems were automatically waived from distribution system asbestos monitoring during the first compliance cycle (1993 - 2001). This same monitoring waiver will be extended to these same systems during the second compliance cycle (2002 – 2010).

PWSs that monitored for asbestos during the first compliance period (1993-1995) were not required to monitor again until after the year 2001, and systems that had levels of asbestos below the MCL were provided use waivers for the remainder of the compliance periods (1996 – 1998 and 1999 – 2001) of the first compliance cycle.

KDHE will continue the use monitoring waiver during the second compliance cycle (2002 – 2010) for the remaining public water supply systems which are still utilizing asbestos-cement pipe in their distribution systems under the following conditions:

All systems with asbestos-cement pipe will be required to monitor for asbestos during the first compliance period (2002 – 2004) of the second compliance cycle (2002 – 2010). Those systems with results below the MCL will receive a use waiver for the remainder of the compliance periods (2005 – 2007 and 2008 – 2010) of the second compliance cycle.

Any surface water system with results above the MCL will be required to monitor quarterly until four consecutive quarters of results are under the MCL and KDHE determines the results to be reliably and consistently below the MCL.

Any groundwater system with results above the MCL will be required to monitor quarterly until two consecutive quarters of results are under the MCL and KDHE determines the results to be reliably and consistently below the MCL.

After a system is reliably and consistently below the MCL, it must monitor annually for three years. If the system remains below the MCL for three consecutive years, it will receive a use waiver for the remainder of the second compliance cycle.

5. Nitrate / Nitrite

Nitrate and nitrite are naturally occurring compounds found in the environment. Nitrogen from decaying plant and animal matter may find its way into groundwater by leaching through soil and percolation caused by precipitation and surface water. Fertilization of agricultural and urban land with ammonium nitrate, and runoff from livestock operations which contains nitrogen-laden animal wastes, are significant causes of nitrate contamination of groundwater.

Excessive amounts of nitrate and nitrite ingestion by infants can cause methemoglobinemia, a life-threatening condition also known as “blue-baby syndrome.” To safeguard infants from this condition, Kansas and federal regulations set an MCL of 10 milligrams per liter (mg/l) for nitrate and 1 mg/l for nitrite as the maximum allowable concentration of these substances in public drinking water supplies. Regulations require that PWSs that produce their own water monitor all of their points of entry (POEs) for nitrate. Nitrate monitoring can be done using a private certified laboratory or KDHE’s state laboratory.

PWSs that fail to monitor for nitrate, or obtain monitoring results greater than the allowable MCLs are required to issue public notifications for those violations. Proof that the public notice was performed must be provided to KDHE by the operators / officers of the PWS.

Who must monitor for nitrate and when?

- All PWSs (community, transient non-community, and non-transient non-community water supply systems) of all sizes (large and small) which obtain water from any source (surface water or groundwater – except another public water supplier) are required to monitor for nitrate at least once per year.
- PWSs which obtain a nitrate monitoring result of 10 mg/l or higher are subsequently required to monitor at least quarterly.
- PWSs that use only treated water purchased water from another public water supplier are exempt from this nitrate monitoring requirement.

Where is the sample collected?

- All nitrate samples are collected at the Point of Entry location. This monitoring site is any location after which the water has been treated (chlorinated) and before which the water enters the distribution system.

What constitutes a nitrate MCL violation?

- A PWS has a nitrate MCL violation if results are greater than the MCL of 10 mg/l. This means any result that rounds up to 11 mg/l or greater is an MCL violation requiring public notice. A result of 10 mg/l is not an MCL violation, however, a result of 10.51 mg/l is an MCL violation.
- Non-community PWSs may under certain circumstances not have an MCL violation as long as nitrate does not exceed 20 mg/l. KDHE will make the determination to which PWSs this exception applies (**See Appendix A**).
- If more than one sample is collected during any quarter, all sample results will be averaged to determine compliance for that quarter.

[Each public water supply entry point was monitored once for nitrite during the first compliance period (1993 – 1995) of the first compliance cycle (1993 – 2001). All nitrite levels were below 50% of the MCL at that time. **Because chlorine converts nitrite to nitrate, and because K.A.R. 28-15-19 requires all public water supplies in Kansas to maintain a distribution system chlorine residual, all public water supply systems in Kansas were waived from nitrite monitoring for the remainders of the compliance periods (1996 – 1998 and 1999 – 2001) of the first compliance cycle. This same monitoring waiver will be extended to these same systems during the second compliance cycle (2002 – 2010).**]

6. Inorganic Chemicals

Inorganic chemicals (IOCs) consist of substances that do not have any carbon in their composition. Two major classes of inorganic chemicals are metals and non-metals. Most of these IOCs occur naturally in the environment and are soluble in water. Because of this high solubility factor, IOCs are potentially significant contaminants of drinking water. Not all IOCs originate from mineral deposits, however. Industrial activities such as metal finishing, textile manufacturing, mining operations, electroplating, and manufacturing of fertilizers, paints, and glass also generate these contaminants. Kansas and federal regulations set MCLs for these contaminants (see Table 1).

Some IOC contaminants are toxic to humans at certain levels. For example, IOCs such as cadmium, chromium, and selenium can cause damage to the kidneys, liver, and nervous and circulatory systems at high levels. Barium has been associated with high blood pressure and mercury has been shown to damage kidneys. Antimony, beryllium, cyanide, nickel, and thallium have been shown to damage the brain, lungs, kidneys, heart, spleen, and liver.

Kansas and federal regulations require community and non-transient non-community PWSs to monitor for IOCs at each POE (**except that fluoride monitoring applies only to community water systems**). Specifically, PWSs utilizing surface water (or GWUDI) sources must monitor annually and groundwater PWSs must monitor at least once every three-year compliance period. Compositing of inorganic chemistry samples will not be allowed.

Once an IOC contaminant is detected above the MCL, these IOCs can be removed from drinking water using various available technologies such as coagulation / filtration, lime softening, reverse osmosis, ion exchange, chlorine oxidation, and activated alumina.

**Table 1:
Regulated Inorganic Chemicals (IOCs)**

IOC	MCL	IOC	MCL	IOC	MCL
Antimony	0.006 mg/l	Cadmium	0.005 mg/l	Mercury	0.002 mg/l
Arsenic	0.010 mg/l	Chromium	0.1 mg/l	Selenium	0.05 mg/l
Barium	2 mg/l	Cyanide	0.2 mg/l*	Thallium	0.002 mg/l
Beryllium	0.004 mg/l	Fluoride	4 mg/l		

Kansas also requires the following additional constituents and parameters to be monitored as IOCs even though there is no regulatory MCL: calcium, chloride, iron, magnesium, nickel, pH, potassium, silica, sodium, specific conductance, sulfate, total alkalinity, total dissolved solids, total hardness, and total phosphorous.

Who must monitor for IOCs and when?

- All community and non-transient community PWSs are required to monitor for IOCs.
- PWSs that use only treated water purchased water from another public water supplier are exempt from this IOC monitoring requirement.
- PWSs using surface water as a source (including GWUDI sources and/or in combination with groundwater sources) must monitor at least once per year (annually).
- PWSs using groundwater as their sole source must monitor at least once during every three-year compliance period.

Where is the sample collected?

- All IOC monitoring samples are collected at the POE location. This monitoring site is any location after which the water has been treated (chlorinated) and before which the water enters the distribution system.

What about violations?

- Any PWS that fails to monitor or has an MCL violation is required to notify the public of each such violation and provide proof to KDHE that a public notice was issued.
- PWSs with an IOC MCL violation are required to monitor at least quarterly for that contaminant.

* The best available technology for cyanide contamination is chlorination. Under K.A.R. 28-15-19, all public water supply systems in Kansas are required to maintain a chlorine residual of 0.2 mg/l free chlorine or 1.0 mg/l of combined chlorine. Therefore, there is no rationale for requiring additional monitoring for cyanide. **All public water supply systems in Kansas were waived from cyanide monitoring during the first compliance cycle (1993 – 2001). This same monitoring waiver is extended to these same systems during the second compliance cycle (2002 – 2010).**

7. Volatile Organic Compounds

Volatile organic compounds (VOCs) are commonly called organic solvents. These compounds are generally found as constituents of many degreasers, industrial cleaners, spot and stain removers, paints and paint thinners / removers, varnishes and lacquers. They are also commonly found in pesticides and herbicides, dry cleaning chemicals, printing inks, press chemicals, and petroleum / fuel products. These compounds can be identified by their distinct “aromatic” smell, and most VOCs are flammable and toxic to varying degrees. As such, they are potentially significant pollution and health hazards.

The following twenty-one VOCs are regulated by Kansas and federal regulations. All community and non-transient PWSs are required to monitor for VOCs at each POE. These regulations set monitoring frequencies and MCLs for each contaminant.

Table 2:
Regulated Volatile Organic Compounds (VOCs)

Compound Name	MCL	Uses
Benzene	0.005 mg/l	fuels, pesticides, paints, pharmaceuticals
Carbon tetrachloride	0.005 mg/l	degreasing agents, fumigants
p-Dichlorobenzene	0.075 mg/l	insecticides, moth balls
o-Dichlorobenzene	0.6 mg/l	insecticides, industrial solvents
1,2 Dichloroethane	0.005 mg/l	gasoline, insecticides
1,1 Dichloroethylene	0.007 mg/l	paints, dyes, plastics
cis-1,2 Dichloroethylene	0.07 mg/l	industrial solvents, chemical manufacturing
Trans-1,2 Dichloroethylene	0.1 mg/l	industrial solvents, chemical manufacturing
Dichloromethane	0.005 mg/l	paint strippers, refrigerants, fumigants
1,2 Dichloropropane	0.005 mg/l	soil fumigants, industrial solvents
Ethylbenzene	0.7 mg/l	gasoline, insecticides
Monochlorobenzene	0.1 mg/l	industrial solvents, pesticides
Styrene	0.1 mg/l	plastics, synthetic rubber, resins
Tetrachloroethylene	0.005 mg/l	dry cleaning / industrial solvents
Toluene	1 mg/l	gasoline, industrial solvents
1,2,4 Trichlorobenzene	0.07 mg/l	industrial solvents
1,1,1 Trichloroethane	0.2 mg/l	metal cleaning / degreasing agent
1,1,2 Trichloroethane	0.005 mg/l	industrial degreasing solvents
Trichloroethylene	0.005 mg/l	paint strippers, dry cleaning solvents
Vinyl chloride	0.002 mg/l	plastics / synthetic rubber, solvents
Xylenes (total)	10 mg/l	paint / ink solvent, synthetic fibers, dyes

Entry points that exceed the trigger level for all VOCs are required to be monitored more frequently. Systems will be notified by KDHE concerning the number and frequency of additional monitoring when it is required. After additional monitoring, systems that have demonstrated that entry points are reliably and consistently below the MCL will be notified by KDHE that they will be monitoring the entry points annually during the quarter of the highest result.

All systems with active entry points that are determined to be reliably and consistently below the MCL after previous detects are allowed to further reduce VOC monitoring at each active entry point to once per three year compliance period any time they experience three consecutive years of annual monitoring at the entry point without a detect.

Large Systems

All large surface water and groundwater systems (greater than 3,300 population) with no previous detects will monitor each active entry point once each year (annually).

Small Systems

All small surface water and groundwater systems (less than 3,300 population) with no previous detects will monitor each active entry point once during each three year compliance period.

Who must monitor for VOCs and when?

- All community and non-transient non-community PWSs must monitor for VOCs.
- PWSs that use only treated water purchased water from another public water supplier are exempt from this VOC monitoring requirement.
- Large PWSs serving more than 3,300 persons must monitor at least once a year (annually).
- Small PWSs serving 3,300 or fewer persons must monitor at least once every three-year compliance period.

Where is the sample collected?

- All VOC samples are collected at the POE location. This monitoring site is any location after which the water has been treated (chlorinated) and before which the water enters the distribution system.

What about violations?

- Any PWS that fails to monitor or has an MCL violation is required to notify the public of each such violation and provide proof to KDHE that a public notice was issued.
- PWSs with a VOC detect or that have an MCL violation are required to monitor more frequently.

8. Synthetic Organic Compounds

Synthetic organic compounds (SOCs) are man-made compounds, many of which are chlorinated and used as herbicides, pesticides, fungicides, and insecticides. They are also used in manufacturing processes. These SOC contaminants are known to be toxic to humans in certain concentrations and can cause damage to the nervous and circulatory systems. They have also been known to cause damage to the liver, kidneys, and gastrointestinal tract in laboratory animals.

Kansas and federal regulations set MCLs for each SOC contaminant. All community and non-transient non-community PWSs are required to monitor for SOC at each POE. PWSs that fail to monitor or have an MCL violation must notify the public of each such violation and provide proof to KDHE of the notification. There are 33 SOC that PWSs are required to monitor.

**Table 3:
Regulated Synthetic Organic Compounds (SOCs)**

Compound Name	MCL	Uses
Alachlor (Lasso)	0.002 mg/l	pesticide
Aldicarb	0.003 mg/l	insecticide
Aldicarb sulfoxide	0.003 mg/l	insecticide
Aldicarb sulfone	0.003 mg/l	insecticide
Atrazine (Atranex, Crisazina)	0.003 mg/l	weed control
Benzo(a)pyrene	0.0002 mg/l	coal tar lining & sealants
Carbofuran (Furadan 4F)	0.04 mg/l	rootworm, weevil control
Chlordane	0.002 mg/l	termite control
Dalapon	0.2 mg/l	herbicide
Dibromochloropropane (DBCP)**	0.0002 mg/l	pesticide, nematocide, soil fumigant
2,4-D (2,4-dichlorophenoxyacetic acid)	0.07 mg/l	weed control, defoliant
2,4,5-TP (Silvex)	0.05 mg/l	herbicide, defoliant
Di(diethylhexyl)adipate	0.4 mg/l	plasticizer
Di(diethylhexyl)phthalate	0.006 mg/l	plasticizer
Dinoseb (2,4-dinitro-6-sec-butylphenol)	0.007 mg/l	insecticide, herbicide
Diquat	0.02 mg/l	herbicide
Endothall	0.1 mg/l	herbicide, defoliant
Endrin	0.002 mg/l	insecticide
Ethylene Dibromide (EDB, Bromofume)***	0.0005 mg/l	gasoline additive, fumigant, solvent
Glyphosate****	0.7 mg/l	herbicide
Heptachlor (H-34, Heptox)	0.0004 mg/l	termite control
Heptachlor epoxide	0.0002 mg/l	insecticide
Hexachlorobenzene	0.001 mg/l	solvent / pesticide byproduct
Hexachlorocyclopentadine	0.5 mg/l	pesticide, fungicide
Lindane	0.0002 mg/l	pesticide
Methoxychlor (DMDT, Marlate)	0.04 mg/l	insecticide
Oxamyl (Vydate)	0.2 mg/l	insecticide
Pentachlorophenol (PCP)	0.001 mg/l	wood preservative, fungicide
Picloram (Tordon)	0.5 mg/l	herbicide, defoliant
Polychlorinated Biphenyls (PCB, Aroclors)	0.0005 mg/l	herbicide
Simazine	0.004 mg/l	herbicide
2,3,7,8 TCDD (Dioxin)	3-8 mg/l	pesticide byproduct
Toxaphene	0.003 mg/l	pesticide

All surface water systems without previous detects must conduct their annual monitoring for pesticide SOC during the months of May or June. This period is considered to be the time during which most surface water systems in Kansas are susceptible to contamination from run-off carrying pesticides applied to crops.

Large Surface Water Systems

All large surface water systems (greater than 3300 population) with no previous detects will monitor each entry point annually during each three year compliance period.

Large Groundwater Systems

All large groundwater systems (greater than 3300 population) with no previous detects will monitor each entry point once during each three year compliance period.

Small Surface Water Systems and Small Groundwater Systems

All small surface water and groundwater systems (less 3300 population) with no previous detects will monitor once during the 2002 - 2004 three year compliance period.

The trigger levels for SOC's are the reporting levels, which with some exceptions, are 10% of the MCL. Entry points that exceed a trigger level for a SOC are required to be monitored more frequently. Systems will be notified by KDHE concerning the number and frequency of additional monitoring when it is required. After additional monitoring, systems which have demonstrated that entry points are reliably and consistently below the MCL will be notified by KDHE that they will be monitoring the entry points annually during the quarter of the highest result.

Large groundwater systems and all small systems that have entry points that are determined to be reliably and consistently below the MCL after previous detects are allowed to further reduce SOC monitoring at each entry point to once per three year compliance period any time they experience three consecutive years of annual monitoring at the entry point without a detect.

[***Ethylene Dibromide is classified as an SOC but is monitored as a VOC under Method 524.2 at the Kansas Department of Environmental Laboratories. The trigger level for Ethylene Dibromide is 0.00001 mg/l.]

Monitoring Waivers

[**Dibromochloropropane (DBCP) is not registered for use in Kansas. Although every public water supply has monitored for DBCP since the beginning of the first compliance period (1993 – 1995) of the first compliance cycle (1993 – 2001), it has never been detected. **All systems are waived from DBCP monitoring during the second compliance cycle (2003 – 2010).**

[****The best available technology for Glyphosate is chlorination. Under K.A.R. 28-15-19, all public water supply systems in Kansas are required to maintain a chlorine residual of 0.2 mg/l free chlorine or 1.0 mg/l of combined chlorine. Therefore, there is no rationale for requiring additional monitoring for Glyphosate. **All public water supply systems in Kansas were waived from Glyphosate monitoring during the first compliance cycle (1993 – 2001). This same monitoring waiver is extended to these same systems during the second compliance cycle (2002 – 2010).**

KDHE has similarly waived monitoring requirements for Diquat, Endothall, and Dioxin (2,3,7,8-TCDD) based on the facts that they are not widely used in the state and they have never been previously detected. Systems are eligible to obtain other site-specific monitoring waivers based on analytical histories and circumstances.

Additionally, based on the SOC monitoring results from the first compliance period (1993 - 1995) of the first compliance period (1993 – 2001), KDHE is permitting all PWSs to monitor for atrazine in substitute for the full SOC analytical scan. However, PWSs that had any SOC detects (besides atrazine) during the first compliance period must continue to monitor for those contaminants.

KDHE is also permitting PWSs using groundwater as their sole source to monitor only for atrazine using an immunoassay method (EPA Method 4670). This immunoassay method is highly sensitive in detecting any contaminant in the triazine family and is only one fourth the cost of the regular method (EPA Method 507).

If the immunoassay method results in a detect, the groundwater PWS is required to monitor for atrazine using method 507. The results from method 507 will be used to determine compliance.

Groundwater PWSs with previous SOC detects and all surface water PWSs are still required to perform the regular atrazine testing using method 507.

Who must monitor for SOC's and when?

- All community and non-transient non-community PWSs must monitor for SOC's.
- PWSs that use only treated water purchased water from another public water supplier are exempt from this SOC monitoring requirement.
- Small PWSs using surface water (and GWUDI and/or in combination with groundwater sources) with a population of 3,300 or less are required to monitor at least once during each three year compliance period with the required sample(s) to be collected during the months of May or June.
- Large PWSs using surface water as a source (including GWUDI sources and/or in combination with groundwater sources) with a population of greater than 3,300 must monitor at least once per year (annually) with the required sample(s) to be collected during the months of May or June.
- PWSs using groundwater as their sole source must monitor at least once during every three-year compliance period.

Where is the sample collected?

- All SOC samples are collected at the POE location. This monitoring site is any location after which the water has been treated (chlorinated) and before which the water enters the distribution system.

What about violations?

- Any PWS that fails to monitor or has an MCL violation is required to notify the public of each such violation and provide proof to KDHE that a public notice was issued.
- PWSs with a VOC detect or that have an MCL violation are required to monitor at least quarterly for that specific contaminant.

9. Unregulated Contaminant Monitoring

The 1996 Amendments to the Safe Drinking Water Act require the EPA to establish criteria for a monitoring program for regulated contaminants and to publish a list of contaminants to be monitored. The data generated by the new Unregulated Contaminant Monitoring Regulation (UCMR) will be used to evaluate and prioritize contaminants on the Drinking Water Contaminant Candidate List, a register of contaminants for which EPA is considering possible new drinking water standards.

The new rule became effective January 1, 2001. All community and non-transient non-community systems that serve over 10,000 people were required to monitor for 12 unregulated chemical contaminants for one year during the three “Assessment Monitoring Years” – 2001, 2002, and 2003. Surface water systems were required to monitor four consecutive quarters; groundwater systems were required to monitor two times approximately six months apart.

There are three levels of monitoring:

- 1) Assessment Monitoring for List 1 Contaminants – must use an EPA designated laboratory.
- 2) Screening Survey for List 2 Contaminants – only required for small systems randomly selected by EPA. **There are only four of these systems in Kansas – City of Olmitz, City of Wellington, Nemaha County Rural Water District No. 3, and City of Park City.**
- 3) Pre-screen Testing.

All data must be reported directly to EPA with copies provided to KDHE. Results must also be reported in the annual Consumer Confidence Reports.

10. Summary - Minimum Samples by System Type

Minimum Samples Required per Point of entry for Three Year Compliance Period

Surface Water System ≤ 3,300:

Nitrate – 3 (annually, 1 per year)
IOCs – 3 (annually, 1 per year)
VOCs – 1
SOCs – 1 (method 507)

Groundwater System ≤ 3,300:

Nitrate – 3 (annually, 1 per year)
IOCs – 1
VOCs – 1
SOCs – 1 (atrazine immunoassay+)

Surface Water Systems > 3,300:

Nitrate – 3 (annually, 1 per year)
IOCs – 3 (annually, 1 per year)
VOCs – 3 (annually, 1 per year)
SOCs – 3 (annually, method 507)

Groundwater System > 3,300:

Nitrate – 3 (annually, 1 per year)
IOCs – 1
VOCs – 3 (annually, 1 every 3 years)
SOCs – 1 (atrazine immunoassay+)

Systems w/ asbestos cement pipes: Asbestos – 1 per compliance cycle

“Minimum Number of Samples” assumes no detects or results above MCL

+Only for systems that have previously tested ND (No Detects) with Method 507

11. Summary – Monitoring Frequency by Contaminant Type

Nitrate:

All Systems: 1 sample / 1 year (annually) – POEs over MCL will monitor quarterly

Asbestos:

Systems with asbestos pipe: 1 sample / 1st 3 year compliance period of second compliance cycle

IOCs:

Groundwater: 1 sample / 3 years
(annually)

Surface Water: 1 sample / 1 year

VOCs:

≤ 3,300: 1 sample / 3 years

> 3,300: 1 sample / 1 year (annually)

SOCs:

Surface Water – population ≤ 3,300:
1 sample / 3 years
(May through June using Method 507)

Surface Water – population > 3,300
1 sample / 1 year (annually)
(May through June using Method 507)

(surface water systems with initial detects will monitor for 2 quarters)

Groundwater:

1 sample / 3 years (atrazine immunoassay if system is without previous detects)

(groundwater systems with initial detects will monitor for 2 quarters)

These notes designate the minimum number of samples required – KDHE may require additional / confirmation samples in order to adequately determine compliance with monitoring requirements.

APPENDIX A

Supplemental Notes

Page 10 – Nitrate MCL Violations

Non-community PWSs may under certain circumstances not have an MCL violation as long as nitrate does not exceed 20 mg/l. KDHE will make the determination to which PWSs this exception applies **according to the provisions of K.A.R. 28-15a-11, as follows:**

KAR 28-15a-11 adopting 40 CFR 141.11(d) by reference:

(d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:

- (1) Such water will not be available to children under 6 months of age; and
- (2) The non-community water system is meeting the public notification requirements under § 141.209, including continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure; and
- (3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and
- (4) No adverse health effects shall result.